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MINERAL RESOURCES OF SOUTHEAST ASIA
PART II

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A striking exhibit in the Philippine Pavilion at the Golden Gate International Exposition was the central pyramid which displayed the phenomenal growth of the gold mining industry in the islands. It was, of course, the gold-purchase policy of the United States which had stimulated this production, so that exports of the precious metal in 1940 were ten times as high as they had been in 1930. (Gold production had grown to five times, but the value of the gold output in world price to ten times, what it had been twelve years before.) Japan, tho desperately in need of gold to make up for its diminishing exports in balancing its foreign trade, did not get a chance at participating in the mining or even the purchase of Philippine gold, or silver either, chiefly because these metals were mined by American companies that did not need the Japanese market, the policy of our own government being so much in their favor. The Philippine Government gained greatly from the expansion of the industry and this probably at no sacrifice of an important natural heritage: For, the more extensively gold has been mined in the Islands, the more extensive have the deposits been found to be. The Filipinos are fortunate, indeed, in that they have plenty of gold in reserve for the difficult time they will face in the years to come when their privileged position in the American market will at least partly have disappeared. They can afford to use the metal freely during the early years of independence if by that means they can get credits and supplies necessary to build up a truly independent economy of their own.

MINERALS AND INDUSTRIAL DEVELOPMENT

In the Philippines no less than in the other countries of Southeast Asia, it will be the non-precious metals, not gold or silver, which, thru their much larger uses in industrial developments, will

have a major influence on economic growth and prosperity. Like the other countries of the region, the Philippines are not condemned—as some writers seem to assume—to be forever engaged in an exchange of tropical raw materials for the finished manufactures of other lands. Indeed, a certain amount of industrialization is almost certain to take place in almost every part of Southeast Asia after this war if only to provide its own populations more cheaply with many of the manufactured goods to the use of which they have become accustomed. But none of the countries in the Asiatic tropics —with the exception of India—has *all* the raw materials necessary for the development of the basic heavy industries. In this their position is no different from that of many European countries which nevertheless are largely dependent on industry for the livelihood of their people. Filipino industrialists have at their disposal enough iron and copper, chrome, and manganese. But there is not enough coal in the Islands to develop self-sufficiency in basic mineral production. The indispensable fuel must be imported.

Since the United States had coal enough for its own industries, the coal deposits of half a billion tons or so in the Philippine mountains seemed like a hoard difficult to bring into use. But when they learned that the Chinese laborers of British Malaya were wrongheaded patriots, the Japanese besought themselves of this sizable nest-egg for their war industries. American and Philippine officials saw no objection why friendly relations should not be preserved by giving the Japanese industrialists what they asked for. Such a trade might become profitable to both sides. From small beginnings five years earlier, the coal exports of the Philippines, mostly to Japan, reached nearly a million and a quarter tons in 1940. But foreign investments in mining properties were permitted in the Philippines only if companies were formed three-fifths of whose stock was owned by Americans or Filipinos. This presented no particular difficulty to the Japanese who are accustomed to work thru such partnerships and who, by their means, already had acquired what amounted virtually to a control of ocean fishing, for example, not only in Philippine waters but practically thruout tropical Asia. Not until 1939 did the Philippine Government include the most promising iron ore deposit, that of the province of Surigao in northeastern Mindanao, among those entirely reserved for public ownership and development.

The Japanese have been in the habit also of buying most of the copper and most of the manganese mined in the Philippines. Only

when war between the United States and Japan had come to be declared "impossible" with alarming frequency, in 1940, did our government divert to this country the greater part of the Philippine exports of these strategically important minerals. Philippine chromite, curiously enough, does not seem to have interested the Japanese particularly, tho our steelmasters and others use large quantities of this metal. It was not until the second half of the 'thirties that it was mined at all extensively, tho the deposit in Zambales is perhaps the largest in the world. Perhaps, American industrialists demanded larger supplies because they did not like the looks of the international situation, or it may have been merely the fashion for shining metal furniture, fittings, and gadgets, which suddenly made itself felt—for, it is chromite that gives the wonderful dark lustre to our plated tea kettles.

Copper, like coal, we can get more cheaply near-by; and the Philippine copper reserves did not especially interest Americans as an industrial raw material. But the copper mines were developed, especially after the commencement of the bloody "co-prosperity" era in North China, at Japanese instigation, partly with Japanese capital and almost entirely for Japanese use. In the meantime, the Japanese have, of course, not only monopolized the supplies of this and other metals for their war industries but have stripped buildings and factories of copper thruout occupied Malaysia, wherever they could find it.

Petroleum and Empire

Today, the most vitally important of all the minerals found in Southeast Asia is a liquid one and one which has only recently entered at all conspicuously into our lives. The reason for this is that altho petroleum has been known and in use for a long time, most of its derivatives have only been invented in our own time. Fifty or sixty years ago, Americans used one of its products, kerosene, in their lamps and perhaps occasionally bought a little jar of vaseline or some such ointment. Mineral oil did not figure among the objects which nations then were fighting for. Colonial possessions were not, at that time, scrutinized as potential yielders of the ill-smelling fluid. For example, before 1911 almost no wells had been drilled in northern Borneo, altho surface seepages were known to exist. In 1938 seven million barrels of oil were taken from the two British protectorates there, Sarawak and Brunei.

On the Philippine island of Cebu, the first well was drilled in

1896, by an English company. During the rebellion and in the first few years of American rule, everybody forgot about petroleum; work on the field in Cebu petered out. In 1910, two wells were drilled in southwest Luzon. These also were discontinued. During the following decade, rumors spread about more important oil reserves in Mindanao, and the Standard Oil Company of California took a hand. However, there was not enough to make continuous exploitation worth while. The prospectors lost a great deal of money. But still the idea persisted that the "oil line" from the northeastern corner of the Asiatic continent to Borneo must pass somewhere thru Philippine territory. Few of the lessees of concessions made money enough to pay their license fees and other expenses. Again, it was the critical political situation in the latter part of the 'thirties rather than an internal condition that started a revival of interest. But the Philippine Government kept a jealous watch over the Commonwealth's natural resources and made it difficult for American companies to operate—or at least so they said. Just before the war, negotiations were pending with the Standard-Vacuum Oil Company which insisted on a monopoly over the larger part of the Islands' potential oil-bearing area, or almost one-half of the total area, before it would incur the admittedly large expense of a thoro survey. In the meantime, actual production has not been large enough to meet the Islands' own needs. In 1940, more than twenty-five million pesos' (half that many dollars') worth of petroleum products were imported, almost one-tenth in value of the Philippines' total imports. Both the legislature and the President of the Commonwealth have been torn in their desire between much needed revenue from oil royalties, as from other national resources, and a justified caution. Somehow, they could not bring themselves to hand practically a monopoly of the business over to an American company as the price for an efficient, large-scale production schedule.

The Netherlands Indies are, of course, one of the world's foremost sources of petroleum. Before the present war they ranked as the fifth largest producer (after the United States, the Soviet Union, Venezuela, and Iran). When they read of the astounding increases in the oil production of Sumatra and Borneo, Japanese militarists already saw in their mind's eye dark opalescent streams wind in and out among the nut-laden palms of their Greater Asia Co-Prosperity Sphere. But when it became apparent that these streams were flowing, not to Japan, but thru the refineries near the producing

fields and in Singapore to Europe and Oceania, the dream changed: the radio amplifiers in Hibiya Park, in Tokyo, began to resound with speeches of affectionate sympathy for the downtrodden people of Island India who had to be "freed" from their European oppressors.

Once before, after the first world war, such a wave of compassion had swept militarist Japan. That was when British interests, with American support, had secured joint rights with Dutch interests, and also some separate rights, to the exploitation of certain Netherlands Indian oil fields. In 1940, about one-half of the capital invested was Dutch, the remainder British and American, with one diminutive Japanese enterprise. About three-fourths of the total capital of more than a billion guilders (530 million dollars) were held by the Royal Shell interests. It was estimated that the annual return to Dutch owners came to about thirty million guilders. This is not exactly small beer but does not by itself constitute the sort of "vital interest" for which nations are willing to go to war. If it had been a question merely of fuel and raw material for peaceful industrial expansion, the Japanese probably could have obtained additional concessions. But everybody understood that the competition for Netherlands Indian oil was in preparation for war.

The more recent probings have shown that, unless new sources should yet be discovered in New Guinea, the oil of the Netherlands Indies is not going to last for long if it is pumped as fast as it was in the pre-war years. Some of the fields are already approaching exhaustion.

Mineral Wealth and Peace

Petroleum differs from other minerals in that its supply in quantities worth tapping is limited while its use has become essential for many industrial purposes. It may not always be so. New sources of it may be discovered or existing ones be found to be much larger than they are now believed to be. Substitutes may be found or invented. But while it is so much in demand and so unevenly distributed over the surface of the globe, this raw material will remain a subject of international dispute unless the nations agree to regard the possession of its sources as a trust in behalf of all humanity. Unlike other minerals that have been used for centuries by the indigenous peoples of Southeast Asia, petroleum is not a part of their heritage thru sense of ownership, and need not

be conserved by tacit agreement as held in trust solely for the natives of the archipelagos, or those of the neighboring oil-bearing continental dependencies. Its occurrence in Burma, Sumatra, and Borneo was not even known when the Indians, the Portuguese, the Spaniards, the British, and the Hollanders in turn occupied these territories. The enormous advantages enjoyed by nations that happen to have petroleum reserves within their borders must be shared if peace is to be secure.

We need not here concern ourselves with the question of how this may best be done. There are those who argue that, like the air above, so the mineral wealth below the surface must belong to all peoples and be controlled in their common interest if peace is to be preserved henceforth. It is an accident quite unrelated to the great migrations and the histories of the racial groups which now occupy these territories that the Philippine Islands and New Guinea are rich in gold, Indo-China in coal, Malaya and the Netherlands Indies in tin, and so forth. Since no one knew what minerals were hidden in the bowels of the earth and could claim a right to them, governments have asserted their possession of everything below the ground—presumably to the hot core. Individuals could secure the right to dig in the sub-soil on payment of a fee. This system has preserved for the technically less advanced peoples of tropical Asia a potential future source of wealth which they might well have lost if access to it had been free to anyone possessed of the necessary equipment. But in principle the native people have no more title to it than have the colonial powers which happen to have conquered them and now rule them. The latter at least can claim that without their maintenance of law and order in these territories there could have been no exploitation of the natural resources at all—except for the most primitive hand-to-mouth existence.

All in all, then, while some will hold that the colonial governments like any other recognized governments are entitled in international law to the as yet unappropriated natural resources of the land they rule, and while others will stress the claims of the native peoples in whose behalf these governments merely exercise a trusteeship, the increasing tendency in world opinion is that the mineral wealth essentially belongs to all and that an accounting for its proper use—or conservation for future use—by any one government is due to all the rest. Southeast Asia is an ideal

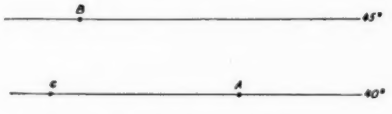
theater in which to try out, when the aggressor has been vanquished, a forward-looking, just, economically helpful and peace-promoting scheme of joint control over the conservation, exploitation, and distribution of the mineral wealth. Incidentally, only a joint international control over the production and distribution of the precious metals, and especially gold, can re-create an internationally recognized basis for stable currencies. Without such control, it would be difficult, indeed, to bring about that fluidity of trade and capital which is so essential to world peace.

MAP READING

ELAINE FORSYTH
Ithaca, New York

LESSON II. THE EARTH'S SYSTEM OF STREETS

Now that you know about the parallels of latitude it's time to learn about the second set of lines. You have seen that it isn't enough to know only the latitude of a place. For example, look at this illustration. We know ever so many facts about city A.



Is A north or south of the equator?
How far is A from the equator?
What direction is A from C?
Which city is nearer to the Pole, A or B?
Is A nearer to the north or south pole?

But there are also many facts that we can't tell about city A when we have only one set of lines. Look at your globe and answer these questions.

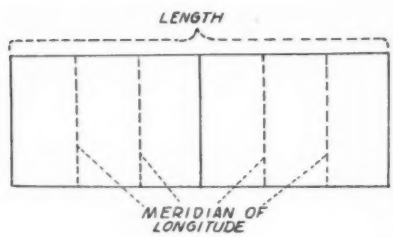
Could A be in China?
Could A be in Turkey?
Could A be in Spain?
Could A be in the United States?

If you looked carefully you found that A could be in any of these countries. To help us locate places in an east and west direction map-makers have drawn another set of imaginary lines.

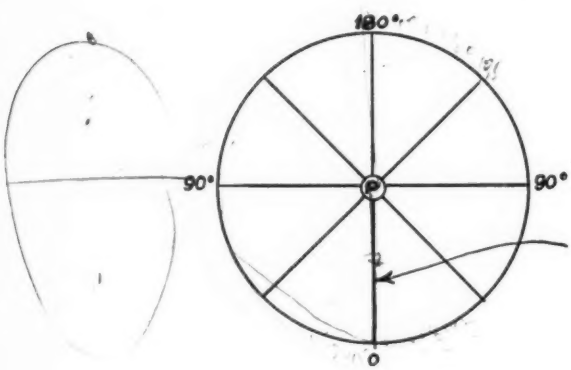
They had much trouble because there was no natural starting

point. Finally the first or zero line was run thru a little town in England called Greenwich. This line runs to the north and south poles. It cuts the equator and every parellel of latitude.

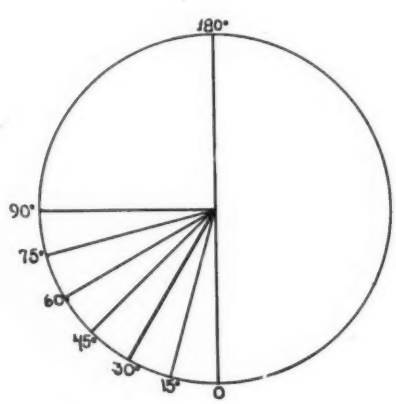
Of course one line isn't enough, so others are added. The geographers could draw one line for every degree around the earth. There would be 360 of them and it would be very hard to look at, so usually they draw them every ten or fifteen degrees. These lines are called *meridians* and they measure *longitude*. Do you remember the shape of the Greek map? The longitude lines measured the length of that map. The word *longitude* means *length*.



There are several things to notice about these meridians. In the first place, they all go thru the poles. In fact, if you look down at the north pole of a large globe, the meridians look like this:



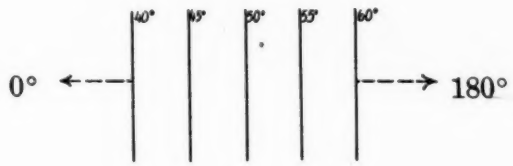
Greenwich Line
or Prime Meridian



While you're looking down at the north pole is a good time to notice how these meridians are numbered. Instead of numbering from zero to 360, the geographers have numbered from zero to 180 both ways. The first line, or zero line, or Greenwich line, is also sometimes called the *prime meridian*. All four of these names mean the same thing.

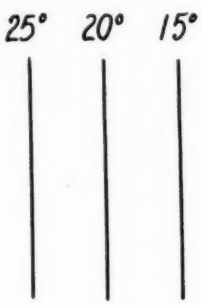
Suppose you fill in the rest of the meridians fifteen degrees apart.

The most important use of the meridians is in telling us how far east or west a place is from Greenwich. You can see in the globe that as you go east or west from Greenwich the numbers get larger till you get to 180°. Look at these lines.

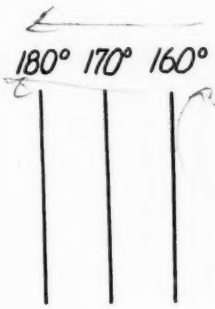


The numbers are getting larger as they go east. You are going away from zero toward the east. We say these numbers are in east longitude. They are east of Greenwich.

Try this:

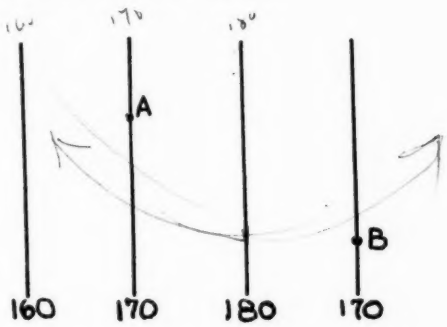


and this:



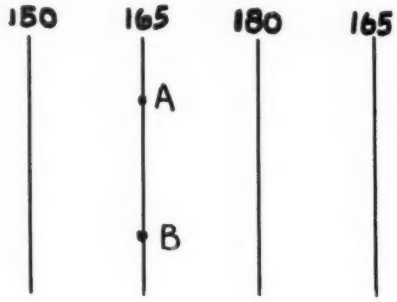
Now stop to think. If you continued to fill in the meridians where would zero be? The numbers are getting larger going west. These meridians are in west longitude, or west of Greenwich.

Now is A east or west of Greenwich?



How about B? Try the exercises.

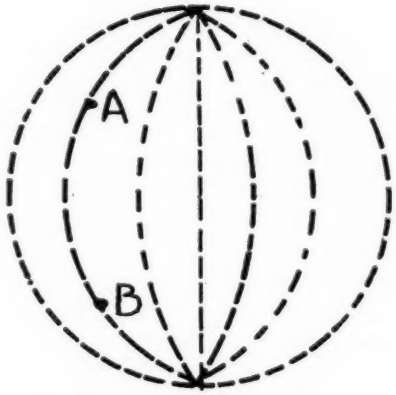
The second important fact we learn from meridians is true direction north and south. Every meridian runs to the north pole and the south pole. As a result of this every point on a meridian is directly north or directly south of any other point on the meridian. This is true no matter how the meridians are drawn. On some maps they look like this:



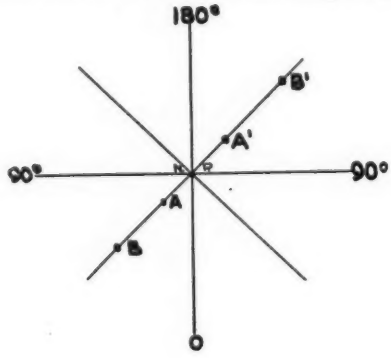
A is north of B.
B is south of A.

On other maps they look like this:

A is north of B.
B is south of A.



And on some of the new maps the meridians look like this:



A is north of B.
B is south of A.

And notice particularly:

A^1 is north of B^1.
B^1 is south of A^1.

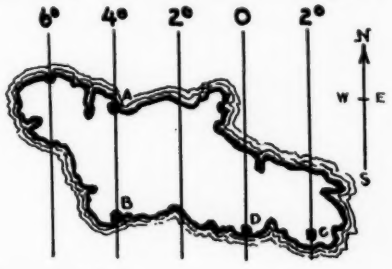
There is one important difference between parallels and meridians that must be considered. Parallels stay the same distance apart from the equator to the pole. 10° of latitude is about 700 miles. Now look at the meridians. Where they cross the equator they are also about 70 miles apart, but as they approach the poles they get closer and closer together until finally they meet—zero miles apart. So the length of a degree of longitude changes from 70 miles at the equator to 0 miles at the poles. We won't learn how to figure all this out now. Here are three figures which you may learn if you want to.

At 30° latitude (one-third of the way to the pole) a degree of longitude is 60 miles.

At 45° latitude (one-half the way to the pole) a degree of longitude is 49 miles.

At 60° latitude (two-thirds of the way to the pole) a degree of longitude is 35 miles.

Navigators—men who figure out the courses for ships and airplanes—have tables which tell them exactly the length of a degree of longitude at any given latitude. Some of you may become navigators and then you'll find out more about this.



Here is an example of the type of exercise you can make up for yourselves and use for practice ⟶

1. Is this island east or west of Greenwich?
2. Which city is in the eastern hemisphere?
3. What direction is A from B?
4. Which city is closest to the North Pole?
5. If this island lies on the equator what is the distance in miles from C to D?
6. If this island is about 60° N. what is the distance from C to D?

Have each person in class draw an imaginary island and make up questions about it. Then pass the papers around the class for other people to answer. Or several people can draw their maps on the blackboard and read their questions for the class to answer. (Remember that meridians are not always straight.)

When you are sure you understand meridians of longitude, add parallels of latitude to your maps. Some of you should be able to think up very interesting problems.

Lesson III. Great Circles

People are always interested in the shortest way from one place to another. You have all heard conversations where someone argued that one street or road was shorter than another. We like to know the shortest way because it may be cheaper or easier or because it saves time.

When we come to traveling long distances over the earth the shortest route becomes even more important. The shortest way between two cities may save us hundreds or even thousands of miles. Navigators of ships have always tried to follow the shortest course. Sometimes they couldn't because of bad weather or icebergs or contrary winds or any number of other reasons; but as a rule modern ships follow the shortest routes.

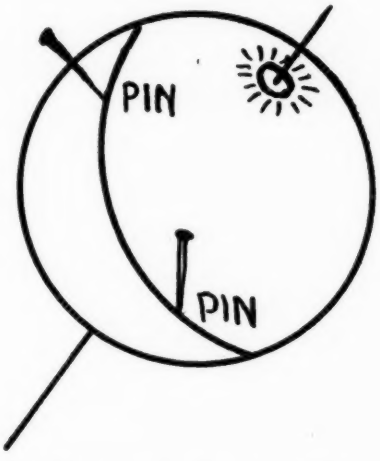
In this day of air travel the shortest route becomes even more important, for the airplane is the first means of transportation which can surmount the ordinary obstacles to travel on land and sea. If air bases are available a pilot doesn't have to worry about mountains, bridges, floods, or ocean currents or icebergs. Of course there are still many weather conditions to be taken into account like storms, fogs, air currents and so on, but with the rapid improvement of planes even these things are not so important. So, to be able to figure out the shortest route becomes more and more necessary as we travel more and more by airplane.

The shortest distance between any two points on the earth's surface lies along the *Great Circle* which connects those two points. Just what is a great circle? The equator is one. The prime meridian plus the 180th meridian is one.

Any circle going all the way around the earth and cutting the earth exactly in half is a great circle. There are hundreds, thousands and millions of great circles possible, because every single place on the earth is on some great circle with every single other place.

Just try making a few great circles. If you use an orange at first it will be easier to handle than the globe. Stick a pin in an orange. Pretend that's where you are on the earth. Now stick another pin into the orange. That's where you want to go. Now connect those two pins with a piece of string, and continue the string all the way around the orange. Make *sure* that the string divides the orange exactly into two equal parts. Maybe you can hold

the string more securely if you stick the pins thru it. Now that string represents a great circle on the orange.



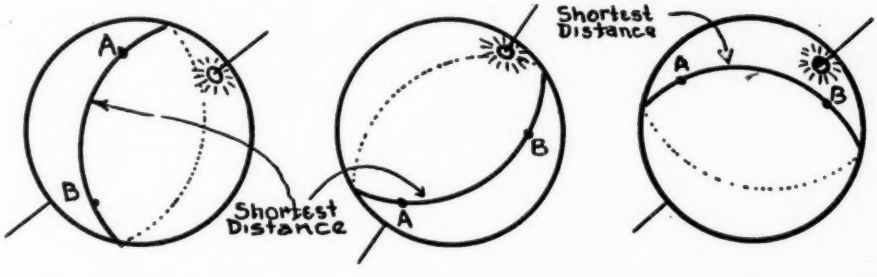
Because the orange is the same shape as the earth, a great circle on an orange is a *very little example* of a great circle on the earth.

Prove to yourself that there can be many great circles on the earth by continuing your experiments with more pins and string.

A great circle has two characteristics:

1. It runs completely around the earth. It is then 25,000 miles long.

2. If the earth were cut along the great circle it would be in two equal parts.



The globe is a larger sphere than the orange. With it you will be able to see the great circle distances in relation to real cities and countries. Suppose you want to find the shortest route from New York to London. It will be along the great circle which connects the two places. Locate these places and connect them with the

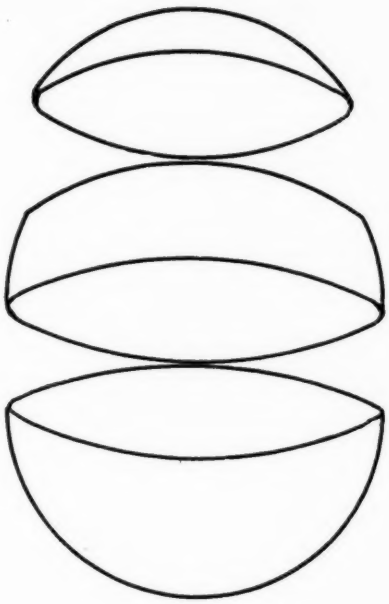
string. Continue the string all the way around the globe and make sure it divides the globe into two equal parts. What is the shortest route from New York to London? People used to wonder why the United States had to have air bases in Newfoundland, Greenland and Iceland. Maybe if they had known about great circle routes they wouldn't have had to wonder.

To look at our wall map you would think that the shortest way from San Francisco to Tokyo would be west along the 42nd parallel. If a place is almost exactly west of another place, it would seem that the shortest way to get there would be to go west. Use your string and measure on the globe the distance between San Francisco and Tokyo along the parallel. Mark this distance on the blackboard. Now find the great circle that connects these places. Measure the great circle distance and put it on the blackboard under the other one. Which is shorter? Did you notice that the great circle route lies *north*west almost to the Aleutian Islands and then *south*west?

Not much more than a year ago people were arguing that Pearl Harbor would protect the Pacific Coast from attack. Just for fun measure the distance from Tokyo to San Francisco thru Hawaii. Compare this with the others. Does this help you to understand the importance of Dutch Harbor? Can you see why the Japanese might want Attu and Kiska and other Aleutian bases?

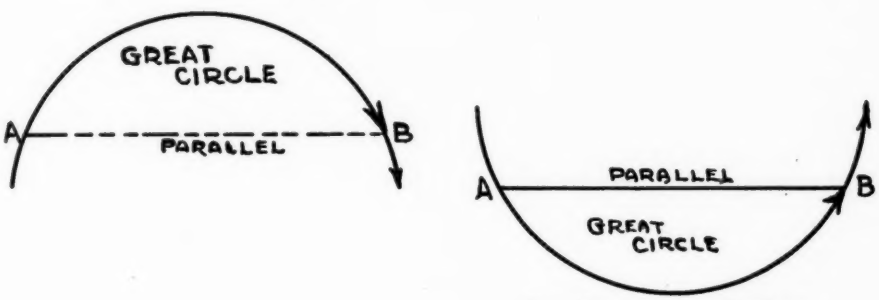
It is easy to figure the distances of these great circle routes on the globe. When you have pulled your string tight between any two places—say New York and London, mark the two ends. Then lay the string along the equator where the degrees are marked off. Count the number of degrees on your string and multiply by 70 (or by 69.4 if you want to be more accurate). This will give you the approximate distance if you have measured carefully. It is always possible to do this on a globe, but it is not possible on most flat maps.

The equator is a great circle. If you are going from place to place on the equator, you would naturally follow the equator since it would be the shortest distance. The parallels near the equator are *almost* great circles, so ships in the tropics, within ten or twenty degrees of the equator often follow the parallels. As soon as you get very far north or south of the equator the parallels become much smaller circles and navigators start sailing on great circle paths. In the northern hemisphere their routes tend to be north of the parallels. In the southern hemisphere the great circle



routes tend to be south of the parallels. This simply means that they take advantage of the roundness of the earth.

Northern Hemisphere



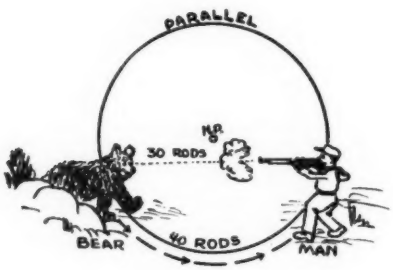
Southern Hemisphere

Just to check this find the great circle route from Magallanes,* Chile, to Sydney, Australia. Notice how close the route lies to Little America. Perhaps some day you'll fly over this route.

There is an old, trick question that may help you to remember that a great circle route is the shortest distance between two

* Punta Arenas on some maps.

points. This is the question: "A man was 40 rods due east of a bear. He had a gun that would shoot only 30 rods, but he shot and killed the bear without changing his position. How could this happen? And where was he? Here's a picture to help you:



Such a thing could take place only at the north or south pole where the parallels become very small circles. As you know parallels show true directions east and west. The man was east of the bear—on the parallel which is a curved line. His bullet went straight. If you extended that line of the bullet all the way around the earth, it would be a great circle. So the shortest distance between the man and the bear is part of a *great circle* and not along the parallel which is a *small* circle.

By the way here's another little problem for you. What direction did the bullet travel?

When we come to the study of maps you will find that great circle routes do not always appear to be the shortest distances on flat maps. You know that they are. You must remember to compare every flat map with the globe which shows great circles so well.

Here are some things to remember:

1. A great circle is a circle that separates the earth into two equal parts.

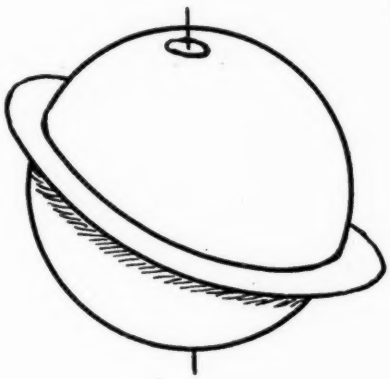
2. The shortest distance between any two places on the earth is along the great circle that runs thru both of them.

3. Great circle routes in the northern hemisphere are somewhat north of the parallels. In the southern hemisphere they are somewhat south of the parallels.

4. Great circle routes are becoming increasingly important because of air travel. A plane can follow the shortest route more easily than any other means of transportation.

Some things to do:

1. Make a great circle tracer. The string method we have used is crude and not very accurate. Take a piece of cardboard larger than the diameter of the globe. Cut out the center so that it just fits snugly over the globe. You can use this to make any great circle on the globe.



2. Consider that you are sending a package by air from New York to Chungking, China. Measure the distances of the various air routes east and west of New York. What is the great circle route? Discuss the possible future need for bases in northern Canada and Siberia.

3. Make a chart showing the great circle route from your home town to ten capitals of the world.

From	*By way of*	*To Capital*
Ithaca	Texas	Canberra, Australia
	West Coast of Mexico	
	Marquesas Islands	
	Tonga Islands	

ADELAIDE AND SOUTH AUSTRALIA

ANNE M. GOEBEL
Emporia, Kansas

THE GARDEN CITY

Colonel Light, first surveyor-general of South Australia, was given the responsibility for selecting the site for the capital of the state. Since he had quarreled with the governor about it, the settlers were called together, and the first South Australian plebiscite was

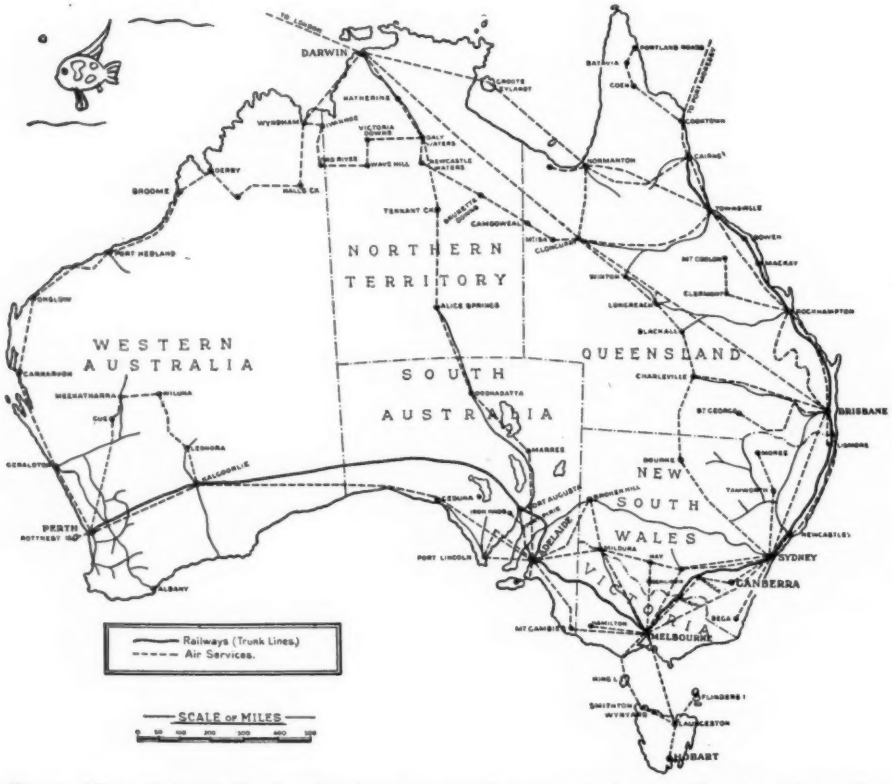


Fig. 1. Map of Australia showing important railways and airways. Courtesy Australian National Travel Association.

taken. The decision favored Light's choice of the plains area stretching from the Gulf of St. Vincent interior. In 1836, he proceeded to survey and lay out the city of Adelaide with elegance as well as with military precision. This was done in order to satisfy the desire of King William IV to do honor to his consort Queen

Adelaide. The city, incorporated in 1841 by the far-sighted Colonel Light, is now a center of 250,000 people. In this the third largest city in the Commonwealth the citizens believe in civic improvement. A flower show held each year in the fall and a music festival in

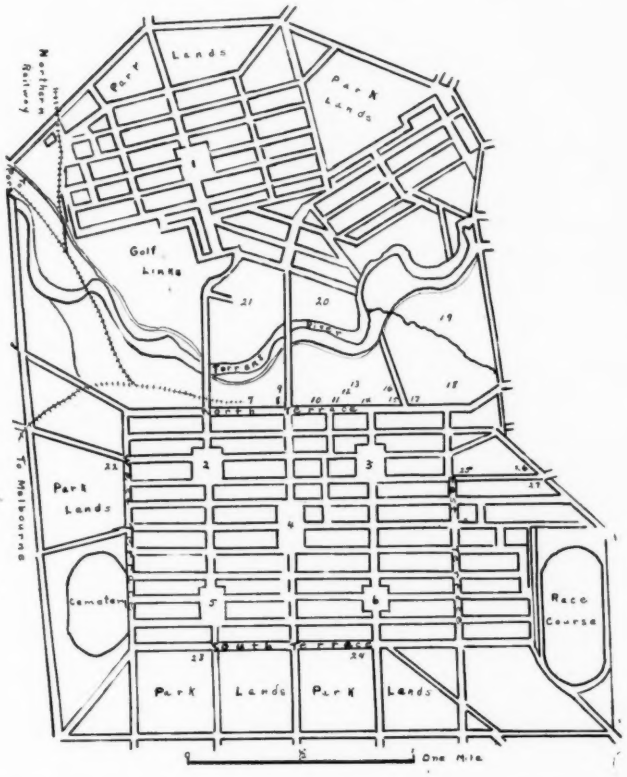


Fig. 2. Sketch map of Adelaide. 1. Wellington Square; 2. Light Square; 3. Hindmarsh Square; 4. Victoria Square; 5. Hurtle Square; 6. Whitmore Square; 7. Railway Station; 8. Parliament House; 9. Government Printing Office; 10. War Memorial; 11. Library; 12. University; 13. Teachers College; 14. Art Gallery; 15. Music Conservatory; 16. School of Mines; 17. Hospital; 18. Botanic Gardens; 19. Botanic Park; 20. University Oval; 21. Adelaide Oval; 22-25. Children's Playground; 26. Water Works; 27. Reservoir.

the spring are outgrowths of aesthetic interests. The Centenial Celebration in 1936 was an outstanding event.

Adelaide is located forty-five miles north of the mouth of the Murray River on the low plateau along the Torrens. The city proper is confined to an area equalling about a square mile. Lined along North Terrace is a succession of interests easily found by tourists. Here they visit the Railway Station, the Government Buildings, the

Fig. 3. North Terrace, Adelaide. Adelaide is the capital city of South Australia and celebrated its centenary in 1936. Courtesy Australian National Travel Association.

War Memorial seen in the lower left hand corner of the picture, the Library, Museum, Art Gallery, University, Teachers College, City Hospital, and the lovely Botanical Gardens that cover sixty-eight acres. Parks and gardens are outstanding in all of the settled parts of Australia, but the gardens of Adelaide are certainly not to be forgotten. Visitors are impressed by the wisteria in October, and by the blossoms equally lovely during other months of the year. Flowers also add to the interest of the twenty-six squares scattered about the city. It is not surprising that plant life does well since the lowest temperature ever recorded in Adelaide was on July 24, 1908, when the temperature dropped to freezing. The average temperature for July, the coldest month of the year, is about fifty-one degrees.

The Torrens River that divides Adelaide proper from one of the residential sections has been developed artificially. The Church of England occupies the most imposing site along its course. North of it there are well-kept homes surrounded by large gardens. A few cattle may be seen grazing on the parklands, beyond which the

suburbs lie. Once the city had outgrown its central nucleus both suburbs and industrial interests developed outside the surrounding parkways of which there are one thousand seven hundred ten acres.

The natural beauty of the city of Adelaide is increased when viewed at night from the grass and scrub-covered Mt. Lofty Ranges that rise to a height of more than two thousand feet. They almost encircle the city, reaching inward from the Gulf of St. Vincent. They are not so high but they catch more moisture than do the Flinders to the north of Adelaide.

Industrial interests in Adelaide have not been neglected. An outstanding industry, the building of car bodies, was launched as a war-time emergency in 1916. The making of automobiles has grown more rapidly than has the demand for automobiles, however. The company, making 26,000 cars annually, is proclaimed the largest motor body factory in the British Empire. As many as five thousand laborers have been engaged in the up-to-date plant that covers forty acres.

Commercial interests have received their share of attention. Large sums of money have been spent on dock improvements. Steamers of moderate tonnage enter Port Adelaide, the larger vessels being accommodated at the Outer Harbor. As compared to Sydney, facilities for docking large vessels are few, but many carcasses of mutton are packed away in the holds of ships that leave the city. Dozens of gallons of livers, bales of wool, and bags of wheat are loaded for overseas trade.

Recreational life at Adelaide is not neglected. Attention has been called to the surrounding mountains. National Park is crossed en route to Mt. Lofty. In the opposite direction, bordering on the Gulf of St. Vincent, is Glenelg, a resort where American tourists are told that good coffee is served. There, too, the biscuits or scones are supposed to be served hot. Midway between Glenelg and Port Adelaide is Henley, also a seaside resort rather near the mouth of the Torrens. Race courses and golf links are scattered about freely among the hills that surround Adelaide.

South Australia

The first settlers came into South Australia from Kangaroo Island. South Australia was declared a province under the British Crown by Governor Hindmarsh on December 28, 1836. The interesting ceremony was performed under an old gum tree that still stands, bent and withered. This tree is visited annually by thou-

sands of people. South Australia, the only state to touch all other states, was granted self-government in 1853, and in 1859 it became an independent state.

SCHEMES FOR SETTLEMENT

There were advanced in South Australia ideas for scientific colonization as well as schemes for settlement advocated by radicals. While in Newgate prison in 1827, Edward Wakefield spent his time writing a pamphlet which he called "A Letter to Sydney." In this he discussed the land policy of South Australia and suggested that it would have been much better had the land been sold rather than given away. His would have been an aristocratic colony; he wanted no convicts and no free grants whatsoever. People would have paid well for the land, and laborers would have been brought to it with the money thus collected. The high price of the land would have prevented the working classes from becoming land owners. This letter which was perhaps sound in theory had its influence. Edward Wakefield's scheme for colonization was supported by the Duke of Wellington in 1831 and was allowed on St. Vincent's Gulf.

Another scheme for settlement was advanced by John Fife Angus, English founder of the South Australian Company. The plan resembled in many ways that of companies organized for settlement in America. Angus sent William Flaxman, an agent, to Australia to watch his interests. Flaxman, allowing his enthusiasm to outrun his discretion, took up large tracts of land for agricultural and pastoral purposes. He bought most of the picturesque district of Bassora, north of Adelaide, in the names of employees, writing to Angus later and telling him of the great things that he had done. John Fife Angus was thus so loaded with debt, that he had to sacrifice his own interests in order to keep faith with the government for the purchase of the lands. He conceived the idea, however, of dividing Bassora into small peasant holdings and presenting them to the state as models for practical colonization.

About this time certain German people having religious difficulties at home, came to Australia and built their villages. They bargained for the land in Bassora and for some of that extending from Angasta to Tanana, arranging for payment on their holdings in long easy terms. It is surprising indeed to visitors to find German customs prevailing for some distance north of Adelaide.

Difficulties were experienced by the German settlers at the outset since the light sandy soil grew little wheat and less hay. When it

was discovered that grapes did well, the Seppelt family as well as the Smith started vineyards in 1849. Since that time five generations of Smiths have been active in South Australia making from their four hundred acres of grapes, wine that has won prizes abroad. As early as 1851 the Seppelts had a wine cellar that was twenty-four feet wide and thirty-six feet long—the largest winery in the southern hemisphere. Their immature wines compete with those made in France and in Spain. Connoisseurs pronounced them excellent. Seventy per cent of the Australian wines are produced in South Australia where three thousand people are employed in the vineyards that supply Britain with a fourth of its needs. The many large wineries directly north of Adelaide give evidence of the fertility of the soil. A dozen were counted while driving over an equal number of miles.

In 1935, of the 53,361 acres of grapes grown in South Australia, 33,157 were of the wine variety. A total of 147,970 tons of fruit were produced. Twenty thousand tons were used for the making of raisins that rival those made in the Douro Valley in Spain or in the San Joaquin in California. In 1935 as many as 5,212,451 gallons of wine were exported from South Australia—the state having about half the grape acreage of the Commonwealth.

Mixed Farming

As has previously been indicated the native soils of South Australia are none too fertile. Since fertilizers have been added, barley does well. The average yield is fourteen bushels to the acre. Much of the barley is used in the making of malt beverages. The three hundred thousand acres grown in South Australia supply a large amount of the barley needed in the Commonwealth as well as some for export. About half of the total production is sent overseas. The total production of barley in South Australia in 1937 was 4,260,462 busheds. It was valued at 609,121 pounds, or at about a tenth of the value of the wheat grown in the state. The wealth of South Australia lies not so much in the soil as in the thrift of its people. Under ordinary conditions this section would have been a region of poor farms.

In traveling northeastward from Adelaide toward Broken Hill the country resembles central and western Kansas, except that it is more rugged. The land, broken occasionally by deep gorges, extends as a fairly level plain. The large acreages left fallow are covered with gorse and Salvation Jane, a low plant having a purple

blossom, that has spread so widely and is such a nuisance to farmers that it is often known as Patterson's Curse. In mid-October the oats are in the shock and cattle and sheep are cropping the stubble. Wheat, especially on the land south of Riverton, yields well. South Australian farmers put about half of their acreage into wheat. From three to four millions acres are planted each year. Wheat makes up more than eighty per cent of the total value of grain crops.

The method for growing cereals varies with both the soil and the rainfall. Since rainfall decreases towards the north, the ten inch average rainfall line is an east-west boundary which marks the edge of effective settlement as well as the edge of the wheat belt. North of Adelaide rainfall tends to follow the northward-extending Lofty and Flinders Ranges.

South Australia contains rich pastoral lands but not until refrigeration was introduced did the grazing industry grow. Twenty-one per cent of the beef is now frozen or canned for export. There were in 1935 as many as 335,344 cattle in South Australia, 160,000 of them dairy breeds. Dairying is now a profitable industry, a greater part of the milk being made into cheese than into butter. In 1935 the 7,945,745 sheep in South Australia produced 81,000,000 pounds of wool.

Much of the area of South Australia, which extends north to the twenty-sixth parallel, is barren land never likely to be of much use to the farmer or stockman. Most of the people as well as the cultivated land and the greater proportion of the livestock are found in the southeastern part of the state. The government has purchased large estates and subdivided them for closer settlement. The Lands Department has set aside swamp lands to be drained and dry lands to be irrigated in much the same manner as it has let crown lands or perpetual leases. The State Bank advances money to settlers for the purchase of improvements and livestock. In the opening of new lands the government provides for its clearing, water supply, road-building, and loan grants for buildings.

Barren Lands

Along the southern coast of South Australia directly north of the Bight and to the north and west of Adelaide is the Nullarbor Plain, one of the driest parts of the continent. This stretch of limestone extends for four hundred fifty miles westward from Port Augusta, the head of navigation on Spencer Gulf. The word, Null-

arbor, means "no trees," for trees will not grow there. Among the few plants that live in this barren region, crossed by the transcontinental railway in 1917, are the salt and blue bushes which seldom grow more than four feet tall. Not a single river is to be seen as you travel across this part of Australia. Water is sometimes obtained from shallow holes which may be dry in the summer time. Underground caves found on parts of the Nullarbor Plain are entered thru blow-holes. A hat, when placed over a blow-hole, may be sucked into the earth and lost or it may be blown into the air.

Fig. 4. Alice Springs, where the railroad connects with "Australia's Burma Road" to Darwin. Courtesy South Australian Tourist Bureau.

Advancement from South into Central Australia, a district where few people choose to live because it is so hot and dry, is slow at best. There are not many places where water can be secured the year round because nearly all of the rivers, springs and water-holes dry up as soon as summer comes. Great stretches of land consist of sandy or rocky gibber plains covered with small round rocks ranging from a light tan to a reddish color. No human beings except a few wandering blacks are seen in this dry barren section extending from twenty-six to twenty degrees south latitude. This is a part of the 400,000 square miles in Australia that is seemingly useless.

Where feed and water for cattle, horses, and sheep can be had at all times in Central Australia, large stations are maintained just as they are in the outlying parts of the Commonwealth. Gum trees around the water-holes provide shade for cattle and sheep during the hottest parts of the day. At flood times, the Finke River, the main drainage of the Macdonald Ranges, reaches to Lake Eyre, giving it a length of a thousand miles. It is likely to flow at only two seasons during the year. If dams were built across the river, the water could be stored, but the cost would be out of proportion

to the gain. The government offered a prize of two thousand pounds to the first person to make a successful crossing from south to north.

Port Augusta not only controls the railway route to the west but also the one northward to Alice Springs. Built on Spencer's Gulf, it is the outlet as well as the inlet for a variety of products. The railway extending from Port Augusta to Alice Springs was finished in 1928. The town was named for the wife of Sir Charles Todd, the South Australian Postmaster General who was largely responsible for the line. It extends by way of Oodnadatta, a settlement six hundred eighty-eight miles from Adelaide. Oodnadatta is at the northern limit of the salt bush. The railway is built near the stony south and west edge of Lake Eyre, a shallow sheet of water nearly forty feet below sea level. There, where about a fourth of the weight of the water is salt and a crust forms near the edges, are the salt pans of Australia. Man and animals are likely to bog down. During the winter, Eyre and other lakes are filled with water, but in December and January they dry up, leaving behind a layer of salt often a foot thick. This is scraped up, and carried to refineries where it is purified. Lake Hart, which has an area of sixty square miles, contains immense supplies of salt of good quality, but owing to its distance about one hundred forty miles from Port Augusta, it is not worked very extensively. The lake district is the lowest part of the continent both from the standpoint of altitude and precipitation. Each of the narrow valleys is a good illustration of a fault or rift that has filled with water.

The trip across Southern and Central Australia is a dirty one. In spite of a fog of dust, accidents are not likely since traffic is light. In peace times there is one train a week as far as Oodnadatta. The trip from Port Augusta to Ooodnadatta may be made by car, but the road is poor, the wind having blown away the soil cover. Many punctures are caused because of dead mulga wood. The sand ridges crossed move in the direction of their length toward the river flats. They parallel the prevailing winds, the northeast side being steep and the south more gentle. More than a hundred years ago Charles Darwin wrote: "The Valleys are of great dimensions and are bordered by continuous lines of lofty cliffs. It is not easy to conceive a more magnificent spectacle than is presented to a person walking on the summit. He arrives on the brink of one of these cliffs without notice."

Central Australia is indeed a land of dry river beds, the streams

having no outlet to the sea. The best land is in the Macdonald Ranges, which stretch east and west of Alice Springs for a distance of about four hundred miles. Cut by gorges, they lead out to the broad open flats. Since the rainfall on these four thousand foot peaks is about eleven inches a year, many cattle, horses, and sheep are reared. Thousands of cattle that thrive on the salt bush, which is very plentiful, are sent every year to South Australia, where they are marketed for a good price. Cattle are driven into town, then taken by train to Adelaide. Camels with their wagons and supplies camp at Alice Springs. A dozen families live in this little town in the heart of the continent. Even tho it is just a telegraph station, all the traffic between North and South Australia passes thru it. Life there is quiet after the stock men leave. There are no trains, motorbuses, or picture shows. White children attend the small school at Alice Springs in the morning and the black children in the afternoon. Their most exciting time in the past has been when the mail arrived once every two weeks. It was brought by train from Adelaide, seven hundred forty-five miles to the south.

Since travel by automobile and plane grows popular, it is doubted as to whether the missing link in the railway line between Alice Springs and Birdum, three hundred sixteen miles south of Port Darwin in North Australia, will ever be built. Access into the fringed coastline of this section of North Australia has been made easier by the building of the Defense Highway. The Port of Darwin is good. It has been linked by rail with Birdum since 1880 and there has been regular Birdum air service for several years. The building of the Defense Highway—the Burma Road of Australia—was completed early in 1941. It closed the six hundred thirty-six mile gap between Alice Springs and Birdum and gave a direct all-weather road between the railroads. The Defense Highway is believed to be the most remarkable feat accomplished by the Australian people thus far during the war, since it strengthens the position of the country as a whole as well as that of North and South Australia.

SPANISH MOSS: FOREST BY-PRODUCT OF THE SOUTH

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State Teachers College
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Vegetable fibers have added much to man's ease and comfort. Early in his upward progress cotton brought needed protection to peoples of arid and tropical lands. Jute from India, ramie from China, sisal from Yucatan, hemp from the Philippines, flax from Europe and kapok from tropical lands of both hemispheres have added, each in its own way, to the development of civilization thruout the world. Recently arriving in the family of commercial fibers, Spanish Moss, product of swamps and forest lands of sub-tropical United States, takes its place and makes its contribution to the welfare of mankind.

In earlier days the moss was used chiefly for packing southern products to be sent to northern markets. In later years when upholsterers needed a good substitute for materials they could no longer obtain easily, they turned to this southern natural resource. Today when you ride in a Pullman car, in an airplane or even in your automobile, you may be sitting on Spanish Moss and can't tell the difference from kapok or horse hair. In some of the better types of furniture, dealers use this American product as upholstery. Perhaps the filling of your next bed mattress may have at one time adorned the crown of a cypress or a live oak tree of our Southland. Certainly present demands have turned the attention of state Conservation Departments as well as individuals to the study of the physical requirements, gathering methods and marketing practices of Spanish Moss to assure a continual flow of this product to meet manufacturing needs. The colorful phases and the romantic story of this activity make the industry in many respects unique among the industries of the world.

THE PLANT

Botanically known as *Tillandsia usneoides,* Spanish Moss grows as an air plant or epiphyte. It takes its name from Tillands, a Swedish botanist, and the specific name because it appears "lichen like." The origin of the more popular term is interesting. When the early French came into the South they asked the local Indians the name of this strange growth. The Indians replied, "Itla-okla"

or tree hair. The French seeing the resemblance between these strands and the beards which their rival Spanish explorers wore, jokingly informed the Indians that the real name was *Barbe Espagnol* or Spanish Beard. The Spaniards came back with the statement that the true name was *Cabello Frances* or French Hair. The Indians thought *Barbe Espagnol* was better and as the French language gave way to the English, the popular name for many years remained as Spanish Beard. Only in recent times was it changed to Spanish Moss (7).

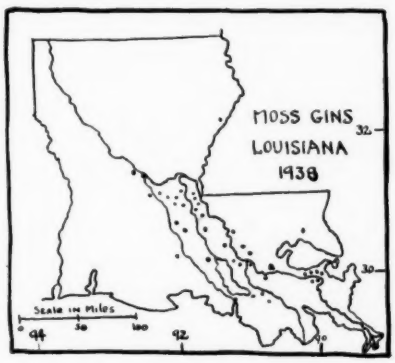

FIG. 1. Sketch map showing the location of moss gins in Louisiana in 1938. Note that the greater number are in the Atchafalaya Basin south of the Red River. (Louisiana Yearbook, 1938)

Distribution. Reports of the distribution of Spanish Moss come from southern Virginia, its northern limit, and along the Atlantic Gulf, and Caribbean coasts to southern Brazil. In the United States it grows entirely on the Atlantic and Gulf Coastal Plain from southern Virginia to Texas (11). Best commercial yields come from the Humid Subtropical Belt as defined by White and Foscue (10), except along the Red and Mississippi valley bottoms (1) where it extends into the southern part of the Cotton Belt. Greatest production within the Humid Subtropical Region comes from the swamps and flatwoods of south-eastern Louisiana, east and northeast of the state's rice region and south of the Red River and from northern Florida (2), north of the 27th parallel (3). In both states these regions lie under the 100 foot contour. Since Spanish Moss derives its sustinence from the air, conditions of the atmosphere are important. Regions of dense growth lie within the rainiest regions of the United States. Louisiana with an average annual precipitation of 55.11 inches claims to be the nation's wettest state, and moss-producing regions of Florida are nearly as wet (12). High temperatures and high relative humidity are also essential. Altho the plant can stand extremes of cold and drought, prolonged periods are detrimental. Moss dealers say that the festoons are longer and usually thicker within 50 to 75 miles of the coast. (5)

Propagation. Spanish Moss propagates by fragments of festoons, not by seeds. Movement from tree to tree is a gradual slow

process because of the weight of the moss. Bits of the moss are not carried far at any one time except by high winds and by birds, which frequently use the moss in nest building. Trees with dense evergreen foliage, tending to ward off the wind blown pieces of moss, account in part for the irregular distribution and apparent preference for certain kinds of trees as hosts even within local areas. Many times the strands of moss attach themselves to trees when they have dropped their leaves.

FIG. 2. Sketch map of moss gins in Florida. Data from "Spanish Moss in Florida" and private correspondence.

From May to June the plant, sometimes reaching 15 to 20 feet in length produces tiny yellow flowers. As the seeds produce slowly, it is the following March before they begin to float thru the air, supported by fine silken hairs. The strands of moss absorb water thru the tiny scales that cover both stems and leaves. Water provides the necessary food and salts are dissolved from the dust of the air or from particles lodged on the bark of the tree or collected under the scales of the plant itself. The structure of the plant and its ability to retain moisture gives needed nourishment during periods of drought. Estimates suggest that nearly 25 per cent of the plant's weight is water due to the power of the scales.

GATHERING THE MOSS

Altho Spanish Moss grows in the southern part of our Gulf and South Atlantic States, commercial production occurs only in the marshy, swampy bayou and flatwood districts of southern Louisiana, especially Atchafalaya Basin and northern Florida, areas where fogs are heavy and common. In Louisiana, the greatest producing state, methods of gathering and the subsequent treatment differ somewhat from the practices in Florida. (9) Two types of workmen in Louisiana share the responsibility for the gathering of the crop. Lowest in the scale comes the moss picker; slightly higher comes the moss farmer.

The moss picker, living in a little make-shift cabin with his family, settles on an island of dry ground in the midst of the

swamp. He has a small garden of corn, sugar cane and potatoes, some pigs and chickens. His hut overlooking the sluggishly moving water of the open swamp or bayou, commands a fairly large area from which he gathers the moss. On either side of the cabin wires strung from one post to another, hold the gray and black moss to dry. A row-boat or scow, a squared-end, flat-bottomed, oar-propelled wooden boat provides his only connection with the outside world. (7) In this he brings his provisions from the outside and carries his semi-cured moss to a convenient place where trucks pick it up and take it to the nearest gin. Sometimes you see a group of cabins, a little colony of moss pickers with their own community life.

Cabins are crude structures containing the barest of necessities. Odd boards and packing boxes furnish the siding for the one-story, one or two-roomed building. Unscreened openings let in the light and air. Cooking is done out of doors. Pigs and chickens play freely around the door-step. The pickers' wants are few and are easily supplied. In these remote recesses of the swamps and bayous the life of the moss pickers may not be a drab one. Often during the twilight and early evening, around a smudge to ward off the ever-present mosquitoes, families and groups of families gather to sing the songs of the southland; songs not unlike their cousins sing around their cabin doors after a long busy day in the cotton fields. In the French sections, the songs take on the characteristics of old songs their grandfathers sang in far off Acadia.

Little regularity governs the life of the moss picker. He rests when he wishes, eats when he's hungry and gathers moss or works in his garden when the urge to bestir himself overtakes him. He gathers enough moss to exchange at the commissary store for supplies to meet his necessary needs. If he can add to this moss supply, muskrat, otter, raccoon, opossum or other pelts so much the better. The store also gives credit for turtles and alligator hides in exchange for flour, molasses, bacon and other goods. Trips to the outside are rare.

Other moss pickers wishing a richer and a more dependable income operate on a more systematic schedule with better equipment. Usually of French descent, these pickers live in a larger, better constructed house, have a larger cleared area for garden and pass the art and skill of the trade on to their children. They have a gasboat which tows one or more barges with their accompanying derrick boats. Not only the labyrinth of rivers and bayous, but also connecting "float roads," first used by the lumberman to float their logs to the mills, permit entrance to the remotest areas, often some

distances from their homes. Some of the barges have cooking and sleeping accommodations so that a stay of several days to a week may be made. Skiffs and derrick boats operate from the mother barge, which receives the day's picking each night. Derrick boats are wide flat-bottomed scows eight to ten feet in length, with a scaffolding at one end, near the top of which a platform, eight or ten feet above the water's edge, holds the moss gatherer. From this platform he pulls the moss from the trees using a long light pole with curved tines at the end. Even at low water he reaches well into the crown of the tree; high water permits even greater access. Young men are liked best for this work and for climbing trees away from the water. In this case men wear spiked boots, operate the long pole with one hand while the other hand grasps the bole of the tree.

Life is not without its hardships. Accidents do occur. Some pickers fall from the trees, poisonous snakes and reptiles abound, and at night swarms of swamp mosquitoes pester the unprotected. Cypress stumps left by lumber companies may be responsible for ripping holes in the bottoms of the barges or gasboats. The man who knows where these dangers await is in great demand. The older, experienced men tend to the work on the boats and the piloting. Upon arrival home the retting process begins, usually in the bayou in front of the picker's house.

In Florida derrick boats are not used and the usual method in gathering the moss more nearly conforms to the simpler method used in Louisiana. Many of the Florida moss pickers supplement their earning by working at other jobs part of the year.

The life of the moss farmer contrasts greatly with that of the moss picker. He lives in a better cabin with more of life's necessities and in a less remote area. Settling nearer a highway, his contacts with the outside world are more frequent. The farmer gathers a moss crop as one of his sources of income along with other crops of corn, sugar cane, and potatoes. Instead of a small patch for his provisions crops he plants larger areas thus giving some surplus for the nearby market. Instead of relying wholly upon the income from his crops and moss, the moss farmer finds that he can work in the cotton harvest from September thru November, then return to the swamps to pick moss when it is in prime condition. A Louisiana report shows that a moss farmer's family of five sold 100,000 pounds of green moss and 20,000 pounds of

cured moss in one year for which they received an average price of 2½¢ per pound for the green and 3¢ for the cured. (7)

Both the moss picker and the moss farmer gather moss in the following ways: 1) gather fallen moss from the ground; 2) hook the moss from the tree limbs from ground or by climbing the tree; 3) strip the moss from trees which have been cut for lumber or other purposes; 4) by the use of derrick boats and long poles.

The methods employed differ between Louisiana and Florida. The French of the Atchafalaya Basin use the derrick boat and hooking poles. A large part of the Louisiana output comes from fallen moss, gathered after a strong wind whips it from tall trees. Hooking moss from the trees is practiced in Florida.

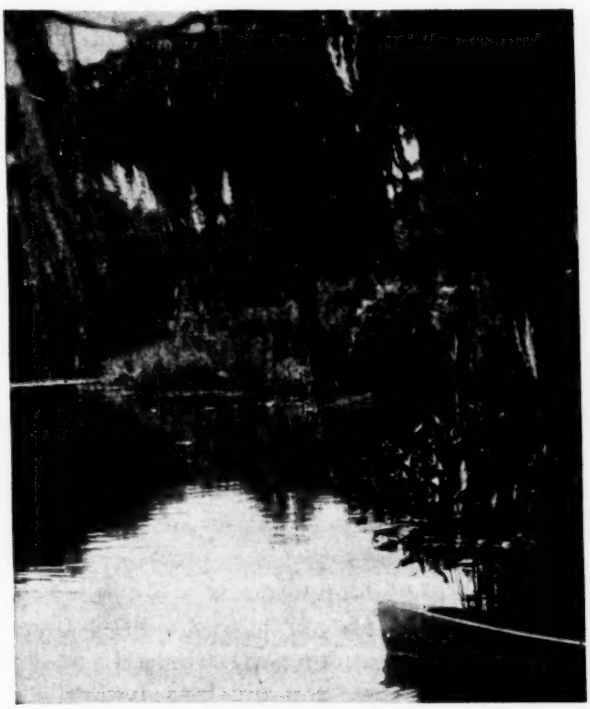

FIG 3. Spanish Moss in Louisiana. A single tree may hold several tons of moss at one time without showing any ill effects of the weight. (Courtesy American Moss Co.)

Some moss gathering takes place thruout the year. The best time comes in the late fall and winter when the moss is toughest. The plant blooms in summer and much of it is too young and tender to withstand the curing process at this time. In the fall the young moss matures, turns grey and the fiber becomes strong enough to make it fit for market. Work usually begins in November and lasts thru April.

Pickers following behind logging operations find this one of the easiest ways to gather moss. They strip the moss from the branches and tree tops left behind. Sometimes pickers overly anxious to get at the good moss, become nuisances to the woodsmen. One lumber

company carrying on logging operations in central Louisiana, granted "moss rights" to pickers in exchange for half of the final returns. In this instance the pickers did all the gathering and curing.

Different grades of moss result largely from (1) the age of the moss, (2) the length of time of curing and (3) the species of tree from which the moss is gathered. Many think that the better grades come from cypress trees.

In the Cajun Country the Spanish Moss industry is known as a "lagniappe crop" or an extra revenue crop which nature furnishes without the help of man. The average picker gathers about 500 pounds a day but this amount may vary depending upon several factors: 1) the energy of the workman; 2) the abundance of the moss; 3) the length of the festoons; 4) the transportation facilities to curing grounds; 5) the character of the weather—less gathered on rainy days. In both Louisiana and Florida both Negroes and whites gather moss. Frequently whole families work together. In Louisiana many whites are French, descendants of Acadian farmers.

THE CURING PROCESS

Curing is a long process. Green moss consists of a core of black vegetable hair covered with a grey bark. The curing process rids the plant of the outer covering. The black hair is the only part of the plant used commercially.

Moss gatherers may cure the moss themselves or sell it directly to a dealer or ginner for curing. Great care must be taken as the quality of the fiber depends largely on the curing. Two methods are used, the "mound" or surface method where the process takes place above ground and the "pit" or trench method. Both pickers and ginners use each method but usually the mound method is used by the pickers and ginners practice the pit method. The pit method of preparation consists of wetting the green moss thoroly and packing it in trenches or pits about four feet deep and four feet wide. They are of various lengths and accommodate several tons of moss. Moist heat generated in the moss, rots the bark and leaves from the core. The chemical contents of the bark serve to toughen the hairy core and color it dark seal-brown or black. (3)

Moss remains pitted from six to eight months, until the bark thoroly detaches itself from the fiber. Careful watching and frequent inspections are needed to remove the moss from the pits before fermentation or decomposition begins. If prematurely removed, white specks of bark cling to the fiber which brings a lower

price on the market. Every month or two while pitting continues, the moss is pitched over bringing the outer portions to the center and the central portion to the outside thus assuring uniformity of the retting process. Rewetting frequently further hastens decay. This process shrinks the bulk and reduces the weight of the moss about 75 per cent. Frequent testing determines the time for the removal of the fiber from the pit. When the outside grey covering slips readily from the inner fibrous portion the fiber is hung on wire fences or lines to dry.

Complete drying of the moss fiber takes several weeks. Workmen turn the fiber frequently to assure uniform drying. Frequency of showers, amount of sunlight and the thickness of the fiber on the lines determine the length of drying time.

FIG. 4. Following the retting process, the fiber is strung on wire fences to dry as shown at this Gainsville gin. (Photo by author)

The mound or surface method requires less preparation. Green moss is simply piled in mounds as large as six feet square and four feet deep, and soaked with water. The same decaying process sets in as in the pit method. Each pile is reworked every month or month and a half bringing top layers to the ground and ground layers to the top. Inner portions are exchanged with outer portions. Ordinarily three months completes the curing. Rains help to wash away the loose outer tissue; the sun dries and hardens the fiber. Fences are used to spread the fiber for drying. (3)

Many ginners prefer to buy the green moss and do their own curing to insure uniform quality of fiber. The best grades result from longer curing; a second grade after three or four months, while a third grade may be obtained in less time.

GINNING

Ginning cleans the dried moss of sticks, trash, and foreign debris and straightens the fibers. Moss gins are simply constructed.

A roof of wood or galvanized iron to protect against sun and rain, and a platform on which to fasten the machinery, meets the necessary requirements. Open sides of the gin permit free movement of air which carries away the dust. Machinery itself consists in principle of a toothed cylinder revolving within a toothed concave, partly enclosed in a drum. Before feeding into the machine the fiber is cleaned by hand of excessive foreign materials. Then it is placed evenly on an endless revolving belt which carries the fiber to the cylinders. Here the moss is loosened, further cleaned, straightened and sorted. From the gin the fiber passes to the compresser and baler. Strong wires hold the condensed fiber, and burlap wrapped around the bales gives protection in shipment. (3)

The curing process reduces the weight from 75 to 80 per cent. Ginning cuts that weight in half. In other words 2000 pounds of green moss yields 500 pounds of dry cured moss and 250 pounds of ginned moss. The weight of the bales varies from 125 to 150 pounds.

Studies show that over 140 pickers are needed to keep a daily gin production of 78,000 pounds of cured moss continuous. The average labor supply at a gin numbers from 15 to 30 men and the average wages paid vary from $1.50 to $2.00 per day (1937). The gin operates about 150 days of the year. Louisiana averaged about 36 active gins in 1938. However a prominent Florida producer states: "Two ginners in Florida and about five in Louisiana account for 75 per cent of the total moss output, with the rest being divided among fifty odd smaller ginners."

Usually the gins are located between the source of supply and the port from which it is shipped or the town from which it leaves by railroad. (4) The gins located near railroads take advantage of sidings built to the plant itself. This reduces handling. Good roads are essential in moving the product by truck to the nearest seaport or rail station.

Extent of the Industry

Since the greatest part of the ginned moss enters the upholstery trade, markets are located in and near places where furniture, automobile cushions, airplane seats and pullman car seats are made. New York, Gowanda and Chicago are important northern centers while New Orleans and Jacksonville divide the major part of the shipping whether by rail or by water. Chicago, Minneapolis St. Louis and Grand Rapids serve the Mid-West Region; Gowanda and Cleveland the western New York and Ohio areas, while New

York and Boston take care of both the metropolitan and New England districts. (6) The U.S. Tariff Commission estimated the moss production at 18,800,000 pounds in 1926 and it has been climbing since.

Prices are quoted f.o.b. shipping point. The price range of ginned moss in the past few years varies from 7 to 12 cents per pound. Altho no complete figures are published estimates show that Louisiana receives from 1½ to 3 million dollars and Florida around 1½ million dollars from the Spanish Moss industry yearly.

With the curtailment of importations of fibers from foreign sources for upholstery purposes and the abundance in the South of this natural resource, the industry bids fair for a promising future.

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EDITORIAL NOTES AND NEWS

DR. GEORGE B. CRESSEY has been appointed a visiting professor in China by the Department of State, and concurrently will serve as representative in China of the National Academy of Sciences. He left for Chungking in October and will return to the United States next summer. Professor Cressey has been Chairman of the Department of Geology and Geography at Syracuse University since 1931, and is on leave for this assignment. Prior to 1931 he taught at the University of Shanghai.

The Department's appointment is a part of its program of cultural relations, and is designed to strengthen the ties between the United States and China. Professor Cressey will visit and lecture at various Chinese universities and research centers in order to bring the greetings of American scientists to their Chinese colleagues. Most Chinese universities have been obliged to take refuge in the interior and are seriously in need of contact with the outside world. Altho it is impossible to send books and apparatus, the Department of State has arranged to forward microfilm copies of professional publications from the United States.

Silver, long associated with money, tablewear, jewelry, dentistry, and photographic film, is becoming increasingly significant as an industrial material. Illustrative of this are the war-time needs of silver in submarines, tanks, planes, torpedoes, guns, surgical instruments, and hospital equipment, as well as in switchboards of great power plants and in electrical installations. In view of these functionings of silver, the United States Treasury has released for war and essential industry, up to July 17, about 700,000,000 ounces. The Treasury's stockpile totaled more than three billion ounces, built up in large part out of the production of Mexico, Peru, and other countries to the south.

Mexico's chemical industry may be greatly enlarged thru the reclamation of salts from the bed of the former Lake Texcoco. This lake was one of five separate lakes formerly occupying the Basin of Mexico. This basin had no natural outlet to the sea. Drainage started in the seventeenth century, but Lake Texcoco was not completely drained until this present century. Rich farmland was anticipated from its bed, but the soils were so impregnated with salts that nothing would grow on it. Instead, during dry winters clouds of dust from its surface even invaded Mexico City. Now a project is started whereby the salts are being leached from the soil. Miles of underground drains discharge their load into a large evaporation basin called El Caracol. Final crystallization takes place in a series of evaporation pans. Thus the old bed may yield salts to stimulate chemical industries and ultimately may become suited to crop production.

Ecuador has completed about half of a projected highway linking the Pacific port of Esmeraldas with Quito which is on the Pan American Highway. Esmeraldas is about equidistant from the Panama Canal and from the Galapagos Islands which are a natural defense area for the Canal.

Using airplanes for scouting and supplementary radio communication, an expedition headed by Colonel Vanique is searching for coal deposits in the Brazilian states of Matto Grosso. Coal deposits are reported along the Rio Fesco, a tributary of the Xingu.

In an effort to solve the food problems of the Bolivian tin mining areas, a hardy variety of wheat, known as Mentana, has been bred that offers promising returns for altitudes ranging up to 11,500 feet. Wheat matures at these heights provided at least twelve inches of rain falls in the growing season, together with adequate ripening temperatures.

GEOGRAPHICAL PUBLICATIONS

J. F. Horrabin. **An Outline of Political Geography.** 157 pp., index, maps. Alfred A. Knopf, New York, 1942. $1.50.

Andreas Dorpalen. **The World of General Haushofer, Geopolitics in Action,** with an introduction by Colonel Herman Buekema. 337 pp., index, maps. Farrar & Rinehart, Inc., New York, 1942. $3.50.

Among the recent politico-geographical books which one need not feel compelled to read, or at least to study, is Horrabin's little treatise. This was originally issued as *An Outline of Economic Geography,* now altered in the later chapters by increased attention to "the question of the political organization of the world, the supreme problem confronting us all today."

The opening chapters discuss geographical factors in history, and attempt a sketch of "World History, The Growth Towards Economic Interdependence." Opening with the beginnings of ancient civilizations, the author, by hop-skip-and-jump, touches upon the "Inland Seas," (actually only the Mediterranean) next characterizes the conquest of the ocean as the first step toward world unification, and, with the utmost dispatch, reaches the final stage "represented by the development of the means of mechanical land transport during the 19th century." In his breath-taking review of world history, Mr. Horrabin disposes of a number of controversial matters with unjustifiable finality, and announces or repeats a number of doctrines which must appear banal to serious students. It is concluded, for example, that "man in Europe was thus stimulated by natural conditions to exert himself more, and so develop his intelligence; man in Africa was not so stimulated. If you are a European, give the glory to climate."

The second part, "The World Today," is of a similar piece and further suffers from the intrusion, here and there, of the author's anti-capitalist views. "By the end of the 19th century," it is said, "the capitalist lords of the States . . . were looking for fresh fields to conquer." In Chapter 6, which opens with a quotation from Scott Nearing, the author roundly condemns "Fascist-Nationalist or Imperialist statesmen," who attempt "in the interests of capitalist groups, to deny the essential economic interdependence of the modern world." All the dominions of the British Empire have this in common: they are capitalist states; this is much to be deplored for "never, in the capitalist world, have the needs and capacities of this or that community been the motive of action." The author is silent on bureaucracy as an alternative, but finds praise for Russia which is "sharply differentiated from the other groups," for here "the ruling power is no longer a capitalist, exploiting class. . . ." There is agreement with H. G. Wells that "the fundamental thing wrong with the capitalist system is that it is not a system." The author is obviously a victim of confused thinking, but apart from this, what place has special pleading in a study which pretends to be a political geography?

Demonstrable errors of fact in the later chapters are too numerous to mention here, but one may consider these examples: "South America is almost without coal; hence her dependence on the United States," and "the financial overlords of the United States" have won a large measure of control over many South American products including, of all things, "the wheat and meat of the Argentine." Many of Mr. Horrabin's maps are horrible examples of cartography. Of the 46, all but 20 are journalistic or "action maps," insofar, at least, as they contain prominent arrows showing presumed lines of movement or force. Among the grossest misrepresentations to be found in any modern work is Fig. 30, p. 92, entitled "Principal Economic Areas of the United States."

With the appearance of Dorpalen's *The World of General Haushofer,* which may be considered a companion volume of Derwent Whittlesey's *German Strategy of World Conquest,* issued by the same publishers, American readers need no longer get their geopolitics third hand.

In his opening two chapters, Dorpalen considers the nature and theory of geopolitics, and, in successive sections, he analyzes the application of geopolitik to world problems, to economic and population policy, and, finally, to war. Each of these chapters consists of two parts: in the first, the author presents a thoughtful and thought-provoking discussion of the topic at hand, and, in the second, reproduces selections from the writings of Mackinder, Ratzel, Kjellén, Haushofer, and from several of the latter's lesser-known confederates. Passing these selections in review—those originally in German are in translation—the reader cannot fail to distinguish between the learned treatises of Mackinder and Ratzel and the partisan-propagandist twist given to geopolitical subject matter—space, power, boundary problems, and the like—by Haushofer and his disciples. Thus, skilfully and effectively, the author exposes the seamy side of geopolitics after first exhibiting the fine tailoring of Mackinder and Ratzel.

Dorpalen's chapters, and the valuable footnotes, aid the reader in separating the sense from the nonsense. Altho much in geopolitics is thoroly bad, we should heed Colonel Buekema's advice that its study will provide "a long first step toward the realism needed if peace is to be more than another Versailles."

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GEOGRAPHICAL PUBLICATIONS

Clark, Embree, Krieger, Roberts, Walker, Weckler and others: **War Background Studies,** The Smithsonian Institution, Washington, 1942, 1943.

Fifteen pamphlets, mostly about 64 pages long, have already been issued in this excellent series. The authors are scientists in the Smithsonian Institution. The pamphlets are well illustrated. Several of them deal chiefly with native peoples. (Embree discusses the Japanese; Krieger the people of the Philippines, and of the western Pacific; Stirling the natives of New Guinea; Weckler the Polynesians; Hrdlicka the Russians). Others treat varied geographic conditions. For example, the one on Iceland and Greenland, by Austin H. Clark (a member of the Association of American Geographers) presents well in 100 pages the geography and history of those islands. The pamphlet on Alaska, by Ernest Walker, for many years a scientist in various parts of Alaska, is an excellent description. Other regions discussed are Siam (H. G. Deignan) and Egypt (F. H. Roberts). Other topics are "Origin of the Far Eastern Civilizations" (Bishop), Natural Camouflage (Freidman), Poisonous Snakes (Cochran), and Are Wars Inevitable? (Swanton)

This series affords a valuable addition to any school library. Copies of some of the series, and perhaps of those still to be issued, may perhaps be obtained for the larger school libraries thru Congressmen.

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